CLAIMS

1. A laser system for treating features on the skin of a patient with laser light comprising:

an imaging subsystem that locates features on the skin to be treated;

a laser;

laser optics that focuses light from the laser onto a feature located by the imaging subsystem; and

a controller, that when a feature is located, controls the laser to radiate a pulse of laser light that is focused by the laser optics to a spot localized about the feature.

2. A laser system according to claim 1 comprising a light source that illuminates regions imaged by the imaging optics with light for which the features to be treated have a reflectance different from that of clear skin so that a feature to be treated appears as a contrasted sub-region of an imaged region of the skin.

3. A laser system according to claim 2 wherein the spectrum of the light radiated by the light source is tunable.

4. A laser system according to ~~any of the preceding claims~~ wherein the spot to which the laser is focused has an area substantially equal to an area characteristic of the size distribution of areas occupied on the skin by features to be treated, multiplied by a factor greater than one.

5. A laser system according to claim 4 wherein the factor is less than 2.

6. A laser system according to claim 4 wherein the factor is less than 1.5.

7. A laser system according to ~~any of claims 4-6~~ wherein the factor is greater than about 1.2.

8. A laser system according to ~~any of the preceding claims~~ wherein the controller controls the laser to radiate a pulse of light only if a located feature occupies an area on the skin consistent with the size distribution of areas occupied on the skin by features to be treated.

9. A laser system according to ~~any of the preceding claims~~ claim 1 wherein the imaging subsystem scans an area of the skin and during scanning automatically locates features on the area to be treated.

10. A laser system according to ~~any of the preceding claims~~ claim 1 wherein the imaging subsystem comprises:

at least one photosensitive surface that generates signals responsive to an image formed thereon; and

imaging optics that images light that it collects on the at least one photosensitive surface;

wherein, to scan the area, the imaging optics are moved relative to the skin so as to image regions in the scanned area onto the at least one photosensitive surface.

11. A laser system according to claim 10 wherein the imaging optics has a focal point and the spot to which the pulse of laser light is focused is centered at the imaging optics focal point.

12. A laser system according to claim 11 wherein the controller controls the laser to radiate a pulse of light only if a feature to be treated is determined to lie substantially within an area centered at the imaging optics focal point having a size substantially equal to the size of the spot to which the laser pulse is focused.

13. A laser system according to ~~any of the preceding claims~~ claim 1 comprising circuitry that receives signals generated by the at least one photosurface responsive to an imaged region of the skin and processes the signals to locate contrasted sub-regions in the imaged region to locate features to be treated.

14. A laser system according to claim 13 wherein the at least one photosensitive surface comprises a single photosensitive surface.

15. A laser system according to claim 14 wherein the photosensitive surface comprises a quadrature detector.

16. A laser system according to claim 15 wherein signals from the quadrature detector are used to determine whether a contrasted sub-region imaged on the quadrature detector is substantially centered within the spot to which the laser pulse is focused.

17. A laser system according to claim 15 ~~or claim 16~~ wherein signals from the quadrature detector are used to determine whether a contrasted sub-region imaged on the quadrature detector is larger than a predetermined minimum size consistent with the size distribution of areas occupied on the skin by features to be treated.

18. A laser system according to ~~any of claims 15 - 17~~ claim 15 wherein the photosensitive surface additionally comprises at least two photodetectors located adjacent to opposite sides of the quadrature detector.

19. A laser system according to claim 18 wherein if any of the photodetectors adjacent to sides of the quadrature detector generates a signal responsive to a contrasted sub-region imaged on the photosensitive surface, a portion of the sub-region is determined to lie outside the spot to which the laser pulse is focused and the laser is not energized.

20. A laser system according to claim 13 wherein the at least one photosurface comprises a first and a second photosensitive surface.

21. A laser system according to claim 20 wherein the first photosensitive surfaces comprises a quadrature detector.

22. A laser system according to claim 21 wherein signals from the quadrature detector are used to determine whether a contrasted sub-region imaged on the quadrature detector is substantially centered within the spot to which the laser pulse is focused.

23. A laser system according to claim 21 ~~or claim 22~~ wherein signals from the quadrature detector are used to determine whether a contrasted sub-region imaged on the quadrature detector is larger than a predetermined minimum size consistent with the size distribution of areas occupied on the skin by features to be treated.

24. A laser system according to ~~any of claims 20 - 23~~ claim 20 wherein the second detector comprises a photodetector having a mask that blocks light from impinging on an area located at it's center.

25. A laser system according to claim 24 wherein if the photosensitive surface generates signals responsive to a contrasted sub-region imaged on the photosensitive surface, a portion of the sub-region is determined to lie outside of the spot to which the laser pulse is focused and the laser is not energized.

26. A laser system according to ~~any of claims 10 – 21~~ claim 10 wherein the imaging optics comprises an objective lens system having a focal point that collects light from regions imaged by the imaging subsystem and wherein the focal point of the imaging optics is the focal point of the objective lens system.

27. A laser system according to claim 26 wherein the imaging system comprises an ocular lens system that receives light collected by the objective lens system and images the received light on the at least one photosensitive surface.

28. A laser system according to claim 27 wherein the objective lens system is rotatable about an axis of rotation that intersects the optic axis of the objective lens system.

29. A laser system according to claim 28 wherein the laser optics comprises a collimating lens system that receives light radiated by the laser, which it collimates and transmits parallel to the axis of rotation.

30. A laser system according to claim 29 wherein the imaging optics comprises a reflector that reflects the collimated laser light towards the objective lens system along a direction parallel to the optic axis of the objective lens system so that the laser light is focused to a spot at the focal point of the objective lens system.

31. A laser system according to claim 30 wherein the reflector is a beam splitter.

32. A laser system according to claim 31 wherein the ocular lens system and the at least one photosensitive surface are positioned on a side of the reflector opposite to the side of the reflector on which the objective lens system is located.

33. A laser system according to claim 30 wherein the reflector is a mirror.

34. A laser system according to claim 33 wherein the ocular optics and the at least one photosensitive surface are stationary with respect to the axis of rotation.

35. A laser system according to claim 34 comprising a beam splitter positioned between the collimating lens and the mirror and wherein light collected by the objective optics is reflected by the mirror along the axis of rotation towards the beam splitter, which reflects some of the collected light incident on it towards the ocular lens system.

36. A laser system according to ~~any of claims 28 - 35~~ claim 28 comprising a motor or actuator that is coupled to the objective lens system and rotates the objective lens system with an oscillatory motion about the axis of rotation, so that the objective focal point moves back and forth along a planar arc having a fixed length.

37. A laser system according to ~~any of claims 10 – 32~~ claim 10 wherein the imaging optics and the at least one photosensitive surface are mounted within a hand held unit.

38. A laser system according to claim 37 wherein the light source is mounted in or on the hand held unit.

39. A laser system according to claim 37 ~~or claim 38~~ wherein the laser is mounted within the hand held unit.

40. A laser system according to ~~any of claims 37 – 39~~ claim 37 wherein the controller is mounted in the hand held unit.

41. A laser system according to ~~any of claims 37 – 40~~ claim 37 comprising a power source mounted in the hand held unit.

42. A method for treating features on the skin of a patient with laser light comprising:

optically scanning the patient's skin to locate features to be treated; and

during scanning, when a feature is located, focusing a pulse of laser light energy to a spot that covers substantially completely the feature, which spot has an area substantially equal to an area characteristic of the size distribution of areas occupied on the skin by features to be treated, multiplied by a factor greater than one.

43. A method for depilating a patient's skin using laser light comprising:

optically scanning the patient's skin to locate hair follicles in regions of the skin to be depilated; and

during scanning, when a hair follicle is located, cauterizing the hair follicle by focusing a pulse of laser light energy to a spot that shadows substantially completely the hair follicle, which spot has an area substantially equal to an area characteristic of the size distribution of areas occupied on the skin by hair follicles, multiplied by a factor greater than one.

44. A method according to claim 42 ~~or claim 43~~ wherein the factor is less than 2.

45. A method according to claim 42 ~~or claim 43~~ wherein the factor is less than 1.5.

46. A method according to ~~any of claims 42-45~~ claim 42 wherein the factor is greater than about 1.2.

47. A method according to ~~any of claims 42 - 46~~ claim 42 wherein scanning comprises moving an optical imaging system having a focal point over the patients skin to image different regions of the skin.

48. A method according to claim 47 wherein moving an optical imaging system comprises moving the focal point close to and along the patient's skin.

49. A method according to claim 47 ~~or claim 48~~ wherein focusing a pulse of laser light energy comprises focusing the energy to a spot centered at the focal point.

50. A method according to claim 47 ~~49~~ comprising analyzing imaged regions of the skin to locate features to be treated.

51. A method according to claim 50 wherein analyzing imaged regions comprises determining whether an imaged region of the skin has a feature having a size consistent with the size distribution of areas occupied on the skin by features to be treated.

52. A method according to claim 50 ~~or claim 51~~ wherein analyzing imaged regions comprises determining whether an imaged region of the skin has a feature to be treated located within a localized region on the skin which is centered at the focal point.

53. A method according to claim 48 wherein the localized region is substantially equal to the size of the spot to which the laser light is focused.

54. A method according to ~~any of claims 48 - 53~~ claim 48 wherein moving the focal point comprises moving the focal point with an oscillatory motion along a first direction on the skin.

55. A method according to claim 54 and comprising moving the focal point in a second direction substantially perpendicular to the first direction while the focal point is oscillating.

56. A method according to ~~any of claims 47 - 55~~ claim 47 wherein moving the optical imaging system comprises moving the optical imaging system by hand.

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